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A DEEP IMAGING SURVEY OF NGC 6475
AND
A DEEP SURVEY OF THE YOUNG OPEN CLUSTER ALPHA PERSEI

Grant NAG5-2171

Summary of Research (Final Report)

For the period 1 January 1993 through 31 December 1997

Principal Investigator:

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This is the final report for our ROSAT grant NAG5-2171 which encompasses two projects: "A Deep Imaging Survey of NGC6475" and "A Deep Survey of the Young Open Cluster Alpha Persei."

We have completed the essential analysis of the ROSAT data pertaining to these two projects. The ROSAT data have been examined to identify point sources, and we then further obtained complementary optical data for the sources in order to determine which of the objects identified as x-ray sources appear to be members of the two open clusters that we selected for study. We have published three papers directly related to the x-ray data (see below), and one other paper directly related to the optical photometry obtained in connection to the ROSAT data analysis (also listed below). In addition, we have used the x-ray data in combination with the optical photometry and with high resolution optical spectra that we have obtained (to derive spectroscopic rotational velocities) to address questions related to the dependence of coronal activity on the rotation rate, mass, and other characteristics of the target stars.

The overall goal of our ROSAT projects has been to determine the time evolution of coronal activity in low mass stars, and from that behavior place constraints on the physical processes involved in generating coronal activity. NGC 6475 and Alpha Persei are important parts of that process. There are very few clusters near enough to obtain useful x-ray surveys with ROSAT; in order to address the issues we are interested in, we need clusters with a range of ages from a few million years to ~ 1 billion years. EINSTEIN had provided some data at 1 Myr (Orion), 100 Myr (Pleiades) and 600 Myr (Hyades) but this sampling was too sparse to delineate the evolution well. By adding IC2391/2602 (30 Myr), Alpha Persei (50 Myr) and NGC 6475 (200 Myr) our group has filled in the gaps (as well as greatly improved the surveys of the Pleiades and Hyades in terms of sensitivity level and area surveyed). We are now beginning to address how these data constrain theoretical models of angular momentum evolution and dynamo magnetic field generation (see paper by Stauffer et al. 1997 and Krishnamurthi et al. 1998 listed below in the "related papers" section).

We are still working on two papers pertaining to this grant (rotational velocities and chromospheric activity of Alpha Persei x-ray sources and rotational velocities and lithium abundances of NGC 6475 sources), but we will publish those papers using funds from other grants.

Papers Directly Connected to Grant NAG5-2171:

1996: The X-Ray Properties of the Young Open Cluster around Alpha Persei -- S. Randich, J. Schmitt, C. Prosser, and J. Stauffer. AA 305, 785.

1996: ROSAT Pointed Observations of the Alpha Persei Cluster -- C. Prosser, S. Randich, J. Stauffer, J. Schmitt, and T. Simon. AJ 112, 1570.

1995: An X-Ray Survey of the Open Cluster NGC6475 (M7) with ROSAT -- C. Prosser, J. Stauffer, J.-P. Caillault, S. Balachandran, R. Stern, and S. Randich. *AJ* 110, 1229.

1996: Photometry in the Open Clusters IC2602 and NGC6475 -- C. Prosser, S. Randich, and J. Stauffer. *AJ* 112, 649.

Related Papers:

1997: Rotational Velocities and Chromospheric Activity of M Dwarfs in the Hyades -- J. Stauffer, S. Balachandran, A. Krishnamurthi, M. Pinsonneault, D. Terndrup, and R. Stern. *ApJ* 475, 604.

1997: X-Rays as a Proxy for Angular Momentum Loss Saturation -- New Rotation Data: A. Krishnamurthi, D. Terndrup, J. Stauffer et al. *ApJ* 493, 1 Feb. 1998.